

REMARKS

In response to the Official Action mailed on December 1, 2006, the application has been amended. No new matter has been added. Reconsideration of the rejections of the claims is respectfully requested in view of the above amendments and the following remarks.

In this amendment, claim 12 has been rewritten as an independent claim, and claim 1 has been amended to depend from claim 12. Claims 1, 15, and 16 have also been amended so that the Bi content set forth in these claims agrees with that set forth in main claim 12.

On pages 2 - 4 of the Official Action, the claims received the following rejections:

(a) Claims 1 - 3, 7 - 9, and 12 - 17 were rejected under 35 USC 103 as unpatentable over JP 09-019790.

(b) Claims 1 - 3, 7 - 9, and 15 - 17 were rejected under 35 USC 103 as unpatentable over JP 08-243782.

(c) Claims 1 - 13 and 7 - 17 were rejected under 35 USC 103 as unpatentable over JP 08-132279.

(d) Claims 1 - 4, 7 - 9, and 12 - 17 were rejected under 35 USC 103 as unpatentable over EP 0622151.

(e) Claims 5 - 6 were rejected under 35 USC 103(a) as unpatentable over EP 0622151 in view of JP 06-087090.

These rejections are respectfully traversed.

Claim 12, which has been rewritten as an independent claim, describes a lead-free solder consisting of Zn, 0.5 - 12 mass % of Bi, at least one of Au, Pt, Pd, Fe, and Sb, and a remainder of Sn. The scope of claim 12 has not been changed by this amendment. None of the cited reference discloses or suggests such a composition.

JP 09-019790 discloses a Sn-Zn-In base lead-free solder alloy containing In as an essential component. Paragraph 008 of this reference reads:

[0008] In the alloy of the present invention, **In is an essential added element** which, as stated above, is added in an amount of less than 3 wt %. Like Bi, In lowers the melting point of an alloy, but in order to increase tensile strength and elongation as in the present invention, the effect of addition of In is greater than that of Bi, so **the addition of In is indispensable** for achieving the initial object of the alloy of the present invention ...

In contrast to JP 09-019790, In is excluded from the composition of claim 12 by its use of the transitional language "consisting of". Accordingly, since JP 09-019790 does not suggest the composition of claim 12, it cannot render this claim obvious.

JP 08-243782 discloses a solder alloy containing zinc, tin, and optionally one or more of antimony, indium, gold, silver, or copper. There is no disclosure of any bismuth, which is a required component of the alloy set forth in claim 12. Thus, as JP 08-243782 does not suggest all the components of the

composition recited in claim 12, claim 12 cannot be obvious from this reference.

JP 08-132279 discloses a Sn-Zn base lead-free solder alloy for use in heat exchangers. The alloy may further contain Cu in order to increase creep strength and to reduce dissolution of the material being soldered (such as heat exchanger fins) in the solder. Paragraph 0008 states that, in addition to Cu, the solder alloy may contain at most 5 wt % of at least one of Ag, In, Sb, Ni, Fe, and Bi.

The Official Action does not specifically explain how this reference meets any of the claim limitations and merely states at the bottom of page 2 that this reference "discloses the features including the claimed solder composition". Therefore, the Applicants can only conjecture that the Examiner interpreted this reference as disclosing a Sn-Zn alloy optionally containing any one or more of Cu, Ag, In, Sb, Ni, Fe, and Bi in any possible combination of these elements.

In fact, however, paragraph 0008 of JP 08-132279 makes it clear that Ag, In, Sb, Ni, Fe, or Bi can only be added to the alloy of this reference in conjunction with Cu and not independently thereof. This fact is supported by the attached declaration under 37 CFR 1.132 by Mr. Shoichi Hirose, a Japanese patent attorney with over 30 years of experience in translating and construing Japanese patent documents, particularly those pertaining to the metallurgical arts. As set forth in this declaration, paragraph 0008 of JP 08-132279 unambiguously states

in plain Japanese that elements such as Ag, In, Sb, etc. are only added to the alloy of JP 08-132279 in addition to Cu, and that there is no suggestion in JP 08-132279 of any of these elements being present in the alloy in the absence of Cu.

As such, any alloy falling within the generic disclosure of JP 08-132279 that contained Bi would necessarily also contain up to 3 wt % of Cu. However, Cu is excluded as an alloying element from the composition of claim 12 of the present application by use of the transitional language "consisting of". Therefore, JP 08-132279 does not suggest an alloy as set forth in claim 12, which contains Bi but does not contain Cu, so claim 12 cannot be obvious from this reference.

EP 0622151 discloses a Sn-In-Zn base lead-free solder alloy containing In as an essential component. As stated above with respect to JP 09-019790, In is excluded from the composition of claim 12 by use of the transitional language "consisting of", so EP 0622151 does not suggest the composition of claim 12 and cannot render this claim obvious.

JP 08-087090 was relied upon as disclosing a flux for an Sn-based solder. This reference does not disclose any specific solder compositions at all, and it does not even relate to lead-free solders. Therefore, just like the other references, it does not suggest an alloy having the composition set forth in claim 12.

Therefore, as none of the cited references discloses or suggests an alloy having a composition as set forth in claim 12, these references cannot render claim 12 obvious. Claim 12 and claims 1, 4 - 11, and 13 - 15 which now depend from claim 12 are therefore allowable. Claims 2, 3, and 17 have been cancelled as unnecessary, so the rejections of these claims are now moot.

Amended claim 10 and claim 16 further patentably distinguish the present invention from the cited references. Amended claim 10 and claim 16 state that the alloy of claim 12 or claim 1, respectively, includes at least one of Au, Pt, and Pd. Amended claim 10 is supported by Table 1 on page 12 of the specification as filed. None of the cited references contains one of Au, Pt, and Pd in combination with Bi and in the absence of In as set forth in claims 10 and 16.

In light of the foregoing remarks, it is believed that the

present application is in condition for allowance. Favorable consideration is respectfully requested.

Respectfully submitted,



Michael Tobias
Registration Number 32,948
Customer No. 27649

#40
1717 K Street, N.W., Suite 613
Washington, D.C. 20036
Telephone: (301) 571-0052
Facsimile: (301) 571-0069
Date: April 2, 2007

Attachment
Declaration under 37 CFR 1.132